DOCUMENT RESUME

ED 336 496 CE 057 303

AUTHOR	Allen, W. Clayton
TITLE	What Should a Model Technology Education Program Look Like? How Have Successful Program Models in Secondary School Technology Education Been Implemented?
PUB DATE	Nov 90
NOTE	32p.; Paper presented at the Mississippi Valley Industrial Teacher Education Conference (77th, St. Louis, MO, November 8-9, 1990).
PUB TYPE	Speeches/Conference Papers (150) -- Reports - Descriptive (141)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Curriculum Development; *Program Implementation; Secondary Education; *State Curriculum Guides; State Programs; *Technological Advancement; *Technological Literacy; Technology
IDENTIFIERS	*Technology Education; *Texas

ABSTRACT

The Texas technology education curriculum model was developed in a group effort spread over 20 years. The curriculum development team, which included representatives of the state education department, industrial arts teachers, and foundation representatives, set program standards, updated the curriculum by integrating a technological approach, developed course titles and course descriptions, and developed a curriculum that reflects current and future technological needs. A major feature of the new curriculum is that it organizes courses around three technology clusters: visual communication, energy/power, and production. The curriculum covers grades 7-12 and is called "Industrial Technology Education." The primary focus of the program is to develop students' abilities to solve problems and to be technologically literate. All courses are activity based and taught in technology laboratories designed to enhance development. The curriculum provides for application and integration of basic academic skills and the three domains of learning (cognitive, affective, and psychomotor). Implementation of the curriculum was carefully planned and monitored for compliance. Recommendations for curriculum development can be drawn from the Texas experience. (Appendixes include transparency masters detailing the curriculum development experience. There are 12 references.) (KC)

77th Conference

MISSISSIPPI VALLEY INDUSTRIAL TEACHER EDUCATION

CONFERENCE

November 8-9, 1990

St. Louis Marriott Pavilion Downtown

St. Louis, Missouri

SESSION I CURRICULUM

TOPIC 2: What should a model technology education program look like? How have successful program models in secondary school technology education been implemented?

Dr. W. Clayton Allen, Chair
Department of Technology
The University of Texas at Tyler
Tyler, Texas

SESSION I: CURRICULUM

What should a model technology education program look like? How have successful program models in secondary school technology education been implemented?

Background

The two questions presented for consideration are ones that have been debated and given considerable attention in formalizing technology education programs. Lauda (1983) stated at this conference that "Our role is to consider models which consider the realities of global society, the education system, politics, budgets, tradition, etc." (p. 1). Growth and expansion of new topics of study during the past half century has rendered the traditional technology education (industrial arts) curriculum inadequate to meet current demands.

Growing out of numerous efforts across the nation in recent years, strides have been made in the development of curriculum derivation systems which tend to simplify the process. Rather than organize around seven or more technical areas with many possible courses, it has become necessary to identify common threads around which to organize a more viable technology education curriculum (Williamson, pp. 17-18).

The Jackson's Mill curriculum theory probably is the most notable curriculum effort in the field today. This project identified what has become the most widely accepted content organization since "woodworking, metalworking, and drafting".In addition to bringing the profession very close to agreement on the content base, the effort also helped place technology in perspective (Wisconsin , 1988 p. 3).

Most professionals in the field agree that the Jackson's Mill effort was largely theoretical and that more work is necessary to implement the theory. As a result, the Technical Foundation of America published Industry and Technology Education: Implementors, and Teachers to translate the theory into a useful curriculum guide. This guide presents four detailed taxonomies, one for each technology education system--communication, construction, manufacturing, and transportation. From these taxonomies, content was organized into courses. A number of states have adopted the taxonomies and program models presented in the guide; however, models vary to reflect respective state philosophies.

Contemporary Curriculum Models

In a comprehensive review of all 51 state technology education/industrial arts curriculum models, Kozak (1987) identified the following "Most Contemporary State Curriculum Plans":

Rank	State
1	New York
2	Illinois
3	Ohio
4	Virginia
5	Texas
6	Iowa
7	Maryland
8	Pennsylvania
9	California
10	Oklahoma

Each plan was reviewed using the following criteria: philosophy/rationales, goals, scope and sequence, cluster concept, course titles by state, classtime, methodologies, and implementation strategy.

The programs cited in this study had numerous titles ranging from industrial arts to various terms incorporating the word "technology". However, "the philosophy/rationale and the goals/ objectives sections of all the analyzed materials were so similar as to be interchangeable" (Kozak, 1987, p. 35). Apparently, a good program will be recognized by whatever name is adopted.

The scope and sequence varied with each state's grade levels included in the technology education program. Of the ten plans studied, seven had K-12 programs. The three states remaining had either middle school or senior high school programs.

All the states providing cluster concepts agreed on an introduction cluster and a communication cluster. After that, there was disagreement regarding the most beneficial grouping of the clusters and courses taught under each cluster. The major area of confusion came with each state's concept of how to group the areas of energy/power/transportation. There were nine various combinations incorporated into the program.

As could be expected, the methodologies used in the ten states varied in degree of complexity. They also varied in the amount of time spent in class. The implementation strategies varied from state to state. One comment cited by Kozak (1987) stands out as possibly a major fault within the profession. "Most of these (curriculum plans) are prepared by small groups. Therefore, they never seem to get implemented or accepted in the field by the teachers who are supposed to use them" (p. 43).

The Texas Model

As chair of the Texas Curriculum Committee since 1982, I have been involved in the development of this model. I have taken the prerogative, with approval of the chair, to direct the questions of this topic to the Texas model. The move to technology education in Texas has not been without challenges; however, I believe the experiences in Texas have not been much different from other parts of the country.

I would like to preface my remarks about the Texas curriculum model, by stating that this model was a group effort that involved over 20 years of unprecedented professional commitment. Classroom teachers, supervisors, teacher educators, leaders in the Association of Texas Technology Education, the Extension Instructional Material Center staff, and the Texas Education Agency Industrial Technology Education staff all worked as a team in a "grass-roots" approach to develop the curriculum.

The impetus leading to the development of a technology education curriculum in Texas was initiated by the leadership of the Texas Education Agency (TEA) in 1967. The Agency and the Moody Foundation jointly funded the research in the early 1970's that provided the philosophical base and technology rationale used as the foundation for the model (Williamson, 1984).

Hayden McDaniel, Director of Secondary Programs for the Division of Occupational Education and Technology at the Texas Education Agency, called a meeting of the Texas Industrial Arts Association (TIAA) leadership in the fall of 1978. He charged them with the responsibility of revising the existing industrial arts curriculum. An update and revision of the industrial arts curriculum had not been done since 1960.

Representing the Texas Education Agency, Mr. McDaniel provided the Texas Industrial Arts Association with the following revision guidelines:

- Update the industrial arts program standards. These standards provided a foundation for the curriculum.
- Update the industrial arts curriculum by using the previous Texas Industrial Arts Association curriculum project's technology thrust. The technology approach had already been accepted by the industrial arts teachers in Texas.
- Develop course titles and course descriptions within the technology areas that revise the traditional industrial arts instructional programs.
- Develop a curriculum that reflects courses that meet changing and future technology needs of students living in a technological society.
- Make sure the instructional changes allow phase-in time for updating teacher skills as well as laboratory facilities and equipment.
- Work with the Texas Education Agency staff, teacher education institutions faculties, public school teachers, supervisors and the professional

> organizations so that the "grass-roots" approach will allow the entire profession to move in a unified manner toward the goal of a "revised curriculum" (Ballard, 1990).

The Texas Industrial Arts Association immediately established the TIAA Curriculum Committee and named Dr. W. A. Mayfield, Professor of Technology, The University of Texas at Tyler as chair. The following are the guidelines that were given by TIAA to the Curriculum Committee:

- Review the previous industrial arts curriculum project rationale and focus on the technology education commitment made by the industrial arts teachers in Texas. Use that rationale as the foundation for the curriculum revision.
- Start immediately on the revision of the program standards for industrial arts.
- Organize a communication network that will utilize the "grass-roots" approach to revising the curriculum.
- Provide an opportunity for every industrial arts teacher in Texas to participate in the revision process.

The guidelines given the TIAA Curriculum Committee by the Texas Education Agency and the Texas Industrial Arts Association have been followed. A major feature of the new curriculum was organizing courses around three technology clusters. These clusters were visual communication technology, energy/ power technology, and production technology. Every Texas industrial arts teacher who was willing to participate had that opportunity. The program standards were updated and in March, 1981, the State Board of Education approved the revised industrial arts curriculum.

The recommendations assembled through the efforts of a state-wide, "grass-roots" committee that was appointed by the TIAA Curriculum Committee were further refined by 26 individuals at Texas A&M University. Dr. Daniel Householder, Head of the Department of Industrial Education, coordinated the workshop. Participants represented classroom teachers, supervisors, and teacher educators. The material that was developed during this two-week effort was then reorganized and published by the Extension Instructional Material Center at the University of Texas at Austin as "The Industrial Arts Guide" (Householder, 1980).

Later, Texas House Bill 246 required all instructional areas to develop "essential elements" to reflect mandated content within each course taught in Texas. TEA appointed a committee from the industrial arts profession to develop the "essential elements" for the newly revised industrial arts curriculum. The committee was composed of middle and high school teachers and representatives from supervisor and teacher educator groups. Members of this committee had been closely involved in the earlier curriculum revision process.

These "essential elements" were submitted to educators and the general public for their comments. These suggestions were evaluated for inclusion in the final document that was submitted and subsequently approved by the State Board of Education (SBOE). After the elements were completed, the committee developed a comprehensive curriculum guide for all 33 industrial arts courses taught in grades 7-12. The guide was developed for the purpose of assisting local districts in program planning (Texas Industrial Arts Association, 1989 pp. i-vi).

A new technology based middle school curriculum was submitted to the Texas Education Agency in 1983 and approved by the State Board of Education in 1984. The State Board of Education mandated major revision of the industrial arts curriculum in 1987. Also, the State Board of Education established cluster committees to review and revise the curriculum in all disciplines. The result was a reduction of industrial arts courses from 33 to 17, a complete revision of the essential elements to a technology base, a change of the name of the discipline from industrial arts to industrial technology, and the publication of the new Industrial Technology Education Curriculum Guide (1989). See Appendix A for a historical development of curriculum.

Texas technology education covers grades 7-12. See Appendix B. It is an open system where students may enter and exit the program according to their interest and background. There are no prerequisites in the program regardless of grade level.

Texas has chosen to call its grades 7-12 program "Industrial Technology Education" as opposed to "Technology Education". At the university level this has caused some problems in terminology due to the existing well established and nationally known industrial technology programs. Industrial technology education draws its content from that part of the broad discipline of technology that relates to industry.

Like many states, Texas followed the same general approach as the Jackson's Mill Industrial Arts Curriculum Theory project in which the input-process-output-feedback universal systems model was used. The educational leadership in Texas chose to organize the curriculum around three technology clusters: communication technology, production technology and energy technology. Texas believes these three clusters comprise the industrial technological world. The primary focus of the program is to develop the ability to solve problems and to be technologically literate. All courses are activity-based and taught in technology laboratories designed to enhance conceptual development (Martin, 1990). The curriculum provides for application and integration of basic academic skills and the three domains of learning (cognitive, affective, and psychomotor).

Industrial technology education is not a required field of study in Texas in any of the 7-12 grades. Two courses are offered in grades 7-8 -- Introductory Industrial Technology I and Introductory Industrial Technology II. The program's first year of study provides students with opportunities to become aware of the full scope of industrial technology education. Students study about communication, energy, and production. In the program's second year, students study only production technology which consists of manufacturing technology and construction technology. Grades 9-12 are divided into levels - I, II, III, and IV. Level I is titled Broad Exploratory and it consists of one course-Technology Systems. This course is designed for students who did not compete Introductory Industrial Technology I in junior high or middle school.

Level II is titled Exploratory and it consists of three courses -- Communication Systems, Energy Systems, and Production Systems. Depending on which systems course they enroll in, students study topics such as: manufacturing graphics, construction graphics, and communication graphics; power/ transportation systems, electricity/electronics systems and principles of technology; and construction systems and manufacturing systems.

Level III is titled Limited Exploratory and it consists of nine courses. The courses provide students an opportunity for in-depth exploration in one or more specific areas of interest including Manufacturing Graphics, Construction Graphics, Communication Graphics, Electricity/Electronics Systems, Power/Transportation Systems, Construction Systems, and Manufacturing Systems, Principles of Technology I, and Principles of Technology II.

Level IV is titled Synthesis and it consists of two courses -- Research and Development and Computer Applications. The R&D course is a capstone experience to the technology curriculum that allows students to exercise the problem solving process. Computer Applications provides opportunities to study applications of the computer to the three technologies of communication, energy, and production.

Currently, the Industrial Technology Education curriculum in Texas consists of 17 separate courses in grades 7-12. The curriculum is still evolving and five years from now further changes will certainly have occurred making it even a more viable curriculum.

Implementation

The implementation of the Texas curriculum model was not left to chance. Key leaders advocated for technology education by providing current literature to decision makers such as the State Board of Education members and The Commissioner of Education. The Association of Texas Technology Education (ATTE) formed a legislative network including classroom teachers, supervisors, and teacher educators to provide political influence. Also, a fifteen member Industrial Advisory Council has been formed. This group includes professionals from outside education, but with expertise in one of the three technologies in order to assist in the relevancy and implementation of the curriculum.

Curriculum is as integral part of the operational plan developed by the Texas Industrial Technology Education Long Range Planning Task Force. This is a cooperative planning effort between the Texas Education Agency and the Association of Texas Technology Education. See Appendix C for a current operational plan for the Curriculum Development Committee that PERT plans the curriculum for five years. The comprehensiveness of the curriculum revision and implementation is evident. Reviewing the total operational plan (available on request), one can identify the following items which do not appear on the PERT chart as curriculum components directed toward implementation of the industrial technology education curriculum (Ballard, 1990).

- Monitor emerging technologies
- Monitor establishment of national demonstration model schools
- Develop new and revise old curriculum material
- Conduct inservice conferences
- Conduct workshops
- Conduct institutes
- Offer college credit courses for teachers in the field
- Revise Examination for the Certification of Educators in Texas (ExCET)
- Monitor compliance visits

Federal and state vocational funding has played a major role in the implementation of the new technology based curriculum. The state only funds the new inventory of technology courses; consequently, if a school district offers one of the old industrial arts courses for local credit, the state will not fund it. This has had a major impact on the program.

During the past six years, over 1.2 million dollars in federal vocational funds have been spent for curriculum development and personnel training. See Appendix D for funding breakdown (Ballard, 1990). This amount includes substantial dollars to the Extension Instruction and Materials Center at the University of Texas at Austin for the purpose of developing curriculum materials. In the past several years, industrial technology education learning activity guides have been developed by classroom teachers for classroom teachers. These guides were distributed initially free to classroom teachers and subsequently are sold to schools on a cost recovery basis. Guides are available for each of the courses in the 7-12 program.

The Industrial Technology Education Curriculum Guide cited earlier in this paper is published by the Extension Instruction and Materials Center at the University of Texas at Austin. This guide includes the rationale, conceptual outline, coded essential elements, and suggested activities. The Center has published teacher directed laboratory activities and student activity packets for each course in the 7-12 program. Also, the Center has available a facility planning guide to assist local school districts implement the new curriculum.

Annually, the Texas Education Agency also offers a number of inservice workshops covering specific topics that support the curriculum. The workshops are offered at little or no cost to the classroom teachers during weekends and the summer months. For example, workshops have been offered covering the topics of communication graphics, energy systems, computer applications, power and transportation systems, CAD, fluid power, CAD/CAM, and robotics. Nationally recognized leaders in technology education have been brought in as facilitators of many of these workshops. Universities have also offered preservice workshops for credit.

Ultimately, the program must be implemented on the local level. The implementation process on the local level is visibly outlined in Appendix E. (Pullias, 1989). The local school districts are required by Texas accreditation standards to develop a local implementation curriculum guide. In addition, the state rule mandates a comprehensive program offering on each high school campus:

> ...The full scope of the high school industrial technology education program, grades nine-twelve, shall include the comprehensive course and/or at least one course from each of the following areas: communication, energy, and production technology (Ballard, 1990).

See Appendix F for examples of campus offering satisfying these requirements. The configuration of courses may also vary according to the size of the district. The school district curriculum offerings for small, medium, and large district may vary significantly. One of the strengths of implementation of the curriculum is that it is flexible and promotes local district adaptation.

Recommendations

This paper has provided some background of the Texas curriculum model and its implementation. The literature indicates there are many other exciting curriculum changes in technology throughout the United States. For the most part, there tends to be agreement as to the future thrust of the technology education/industrial arts curriculum. Texas appears to be proceeding in a similar direction. If a goal of the Texas curriculum effort is to align its curriculum with major curriculum thrust throughout the nation, it should succeed with minor adjustments. The following recommendations are based on the information found in current literature and from state curriculum review cluster meetings conducted by the Texas Education Agency:

- Change the curriculum name of industrial technology to technology or technology education.
- Emphasize in the rationale that the content is drawn from a much broader base than industry.
- Replace the term "universal" with a more accepted term such as "cluster".
- Revise and fine tune the essential elements.
- Expand the number of teacher inservice workshops in selected content areas to help teachers fully implement the new curriculum.
- Allocate more state funds and create programs to enhance the number of qualified students who exit with industrial technology teaching certification.
- Reduce the number of common essential elements.
- Add a course entitled "Space Technology" to the list of approved courses in industrial technology.
- Add the industrial technology education courses entitled "Computer Applications" to the list of computer courses that meet the state computer science requirement.
- Allow Principles of Technology I or II to substitute for one unit of science credit for high school graduation.
- Promote technological literacy and to balance the core curriculum, require students to complete one credit of vocational education in grades 9 - 12.

References Cited

Association of Technology Education and The University of Texas at Austin (1989). Industrial technology education curriculum guide. Austin: The University of Texas at Austin, Extension Instructional and Materials Center.

Ballard, N. E. (1990, October). [Texas industrial technology education curriculum material]. Unpublished raw data. Texas Education Agency, Industrial Technology Education Section, Austin.

Householder, D.L. (1980). A proposed industrial arts curriculum guide for secondary schools in Texas. Austin: Texas Education Agency.

Kozak, M.R. (1987). A review and analysis of the ten most contemporary technology education/industrial arts curriculum plans in the nation. Austin: The University of Texas at Austin, Extension Instructional and Materials Center.

Lauda, D.P., (1983, November). Can industrial arts close the gap between theory and to start a new industrial arts profession: If so, what is the impact of the development of technical (technology) education on industrial arts programs with regard to curriculum, budget, staffing and enrollment: Proceeding of the 70th Mississippi Valley Industrial Teacher Education Conference, Chicago.

Martin, G.C. (1990, September). The development of industrial technology education from an industrial arts program in Texas - the history, procedures and accomplishments. Unpublished manuscript, Southwest Texas State University, School of Applied Arts and Technology, San Marcos, Texas.

Pullias, D. (1989). [Texas industrial technology education curriculum material]. Unpublished raw data. Richardson Independent School District, Richardson, Texas.

Snyder, J.F. & Hales, J.A. (Eds). (1981). Jackson's mill industrial arts curriculum theory. Charleston, West Virginia: West Virginia Department of Education.

Texas Industrial Arts Association (1985). Curriculum guide for industrial technology. Tyler. Texas Industrial Arts Association.

The Technical Foundation of America. A guide for curriculum designers, implementors, and teachers. Lansing, IL.: Author.

Williamson, M.D. (1984). A rational for industrial technology in Texas. Austin: Texas Education Agency.

Wisconsin Department of Public Instruction. (1988). <u>A guide to curriculum planning in technology education.</u> (Bulletin No. 8330). Madison; Wisconsin, Author.

HISTORICAL DEVELOPMENT OF TEXAS CURRICULUM

1967	Texas Education Agency (TEA) initiated curriculum study.
1970-74	Texas Education Agency and Moody foundation jointly funded research used to develop the Technology rationale for the new curriculum.
1979	Charge by Texas Education Agency to revise Industrial Arts curriculum.
	State curriculum committee reorganized.
	Area curriculum workshops conducted by curriculum committees.
1980	Texas A&M leadership development workshop.
	Industrial Arts Curriculum Development Center established at The University of Texas at Austin.
	Texas Industrial Arts Association (TIAA) proposed new curriculum that includes three technology clusters.
1981	State Board of Education approved new curriculum.

Appendix A

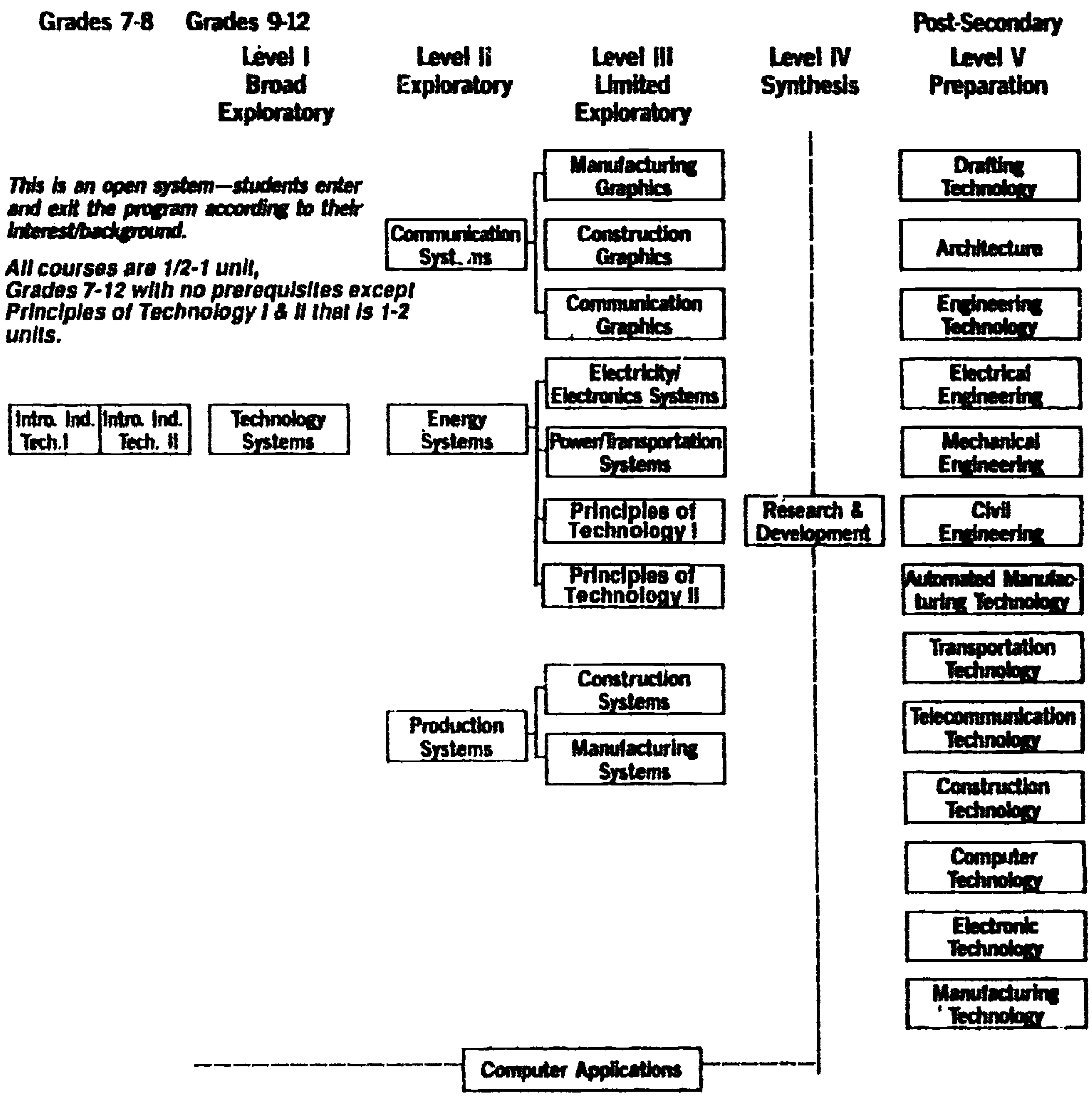
HISTORICAL DEVELOPMENT OF TEXAS CURRICULUM (continued)

1981	House Bill 246 passed by legislatur: required essential element/state mandated content.
1984	Rationale for industrial technology in Texas published.
	State Board of Education approved new technology based middle school curriculum.
1985	Texas Industrial Arts Association Curriculum guide for industrial technology published.
1987	State Board of Education mandates major revision of industrial arts / reduction in number of courses.
1988	State Board of Education approved new curriculum.
	Name changed from Industrial Arts to Technology.
1989	Industrial Technology Education Curriculum Guide published by The University of Texas at Austin.

Articulation for Industrial Technology Education

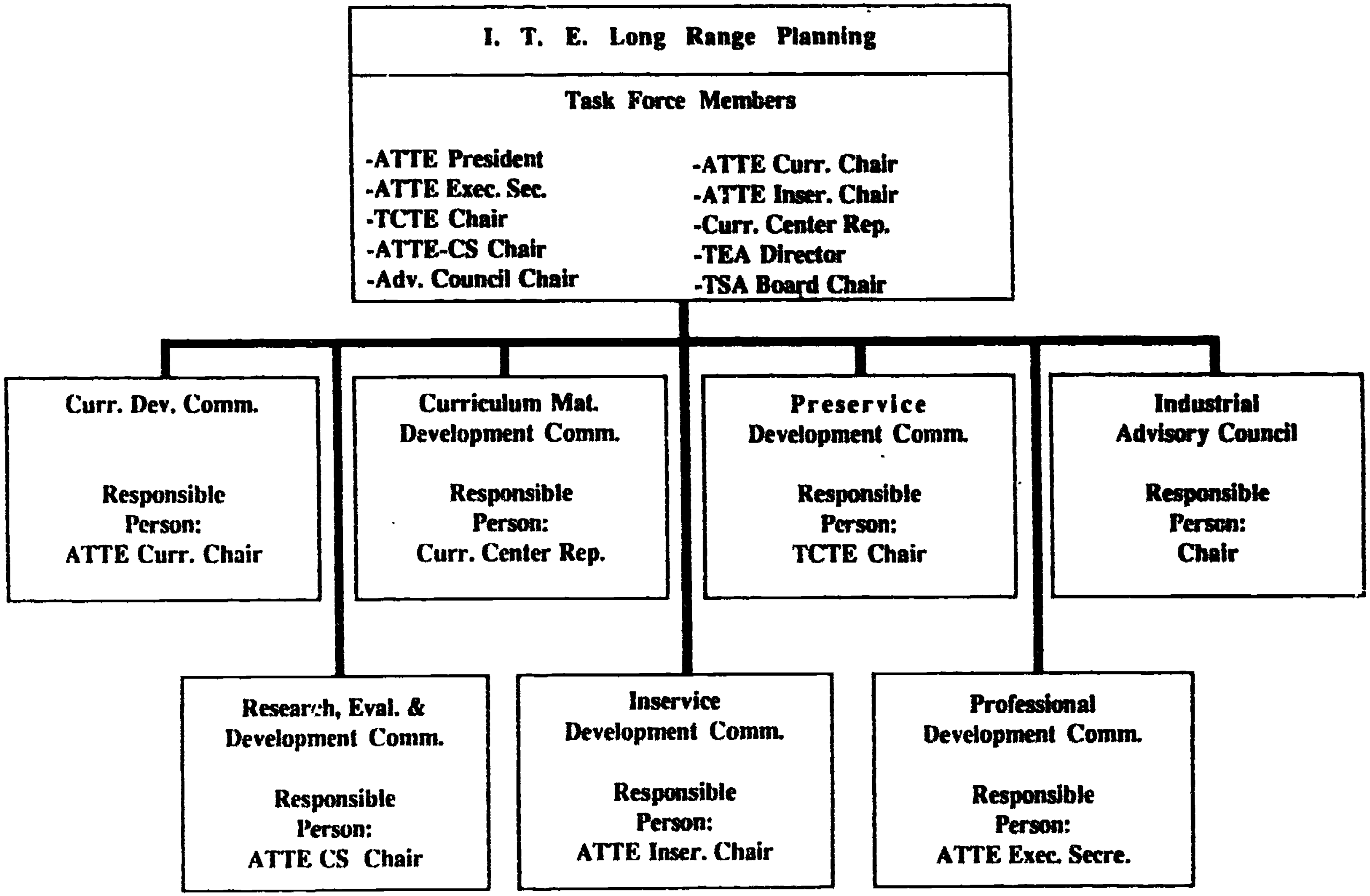
This is an open system—students enter and exit the program according to their interest/background.

All courses are 1/2-1 unit, Grades 7-12 with no prerequisites except Principles of Technology I & II that is 1-2 units.



Appendix B

Appendix C


I. T. E. Long Range Planning
Task Force Members
-ATTE President
-ATTE Exec. Sec.
-TCTE Chair
-ATTE-CS Chair
-Adv. Council Chair
-ATTE Curr. Chair
-ATTE Inser. Chair
-Curr. Center Rep.
-TEA Director
-TSA Board Chair
Curr. Dev. Comm.
Responsible Person: ATTE Curr. Chair
Curriculum Mat. Development Comm.
Responsible Person: Curr. Center Rep.
Preservice Development Comm.
Responsible Person: TCTE Chair
Industrial Advisory Council
Responsible Person: Chair
Research, Eval. & Development Comm.
Responsible Person: ATTE CS Chair
Inservice Development Comm.
Responsible Person: ATTE Inser. Chair
Professional Development Comm.
Responsible Person: ATTE Exec. Secre.

FIVE ONE-YEAR PLANNING OBJECTIVES

PLANNING AREA: Curriculum

1990-91 OBJECTIVES:

. TEA revises Chapter 75

. ATTE proposes revisions in the state curriculum

. TEA publishes the safety guide

. A portion of the written tests for state competition is developed

. TSA conducts state contests

. TSA updates rulebook for 1992 competition

. TSA conducts leadership conferences for students

1991-92 OBJECTIVES:

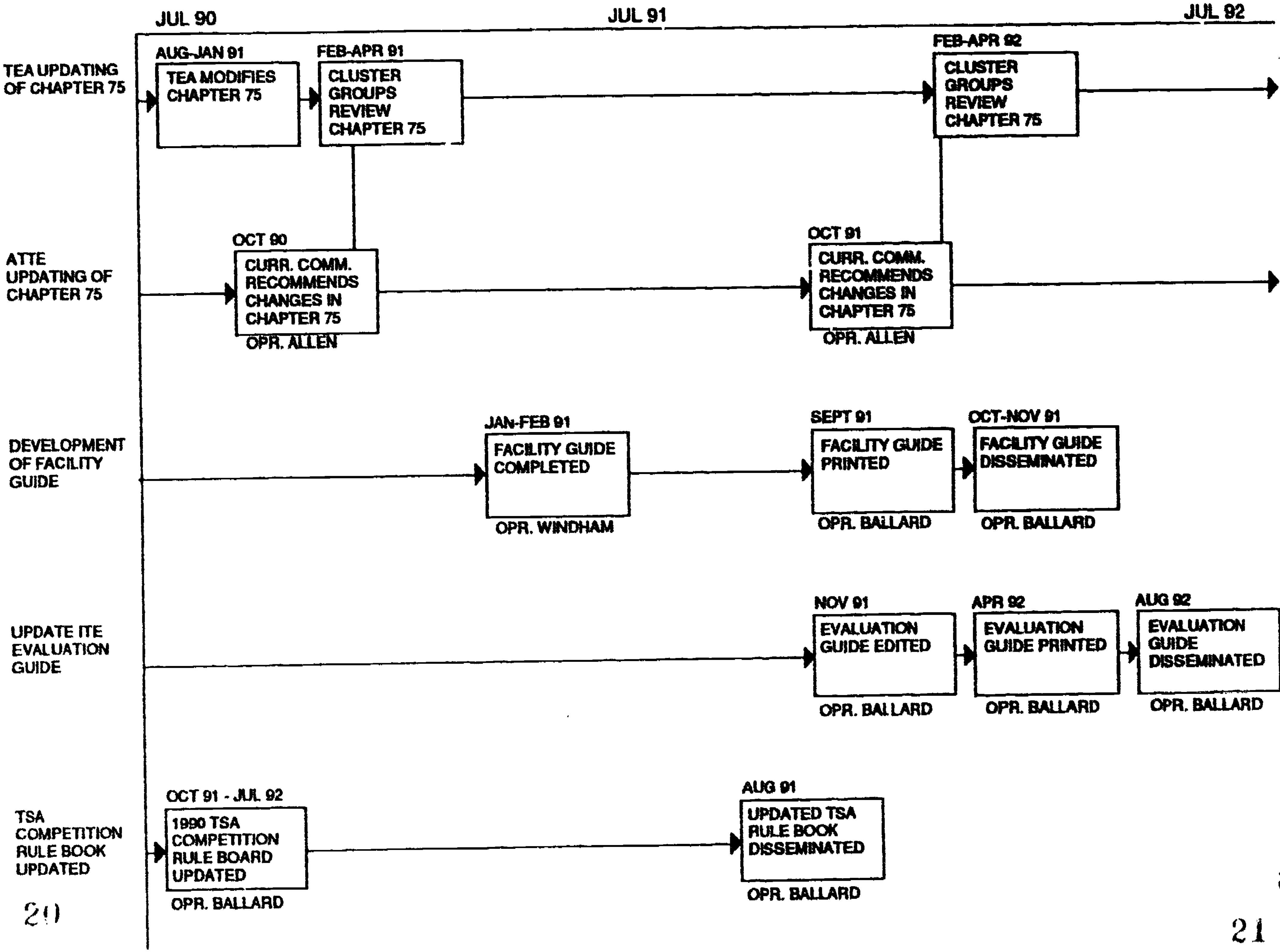
. TSA conducts leadership conferences for students

. ATTE proposes changes in the state contests.

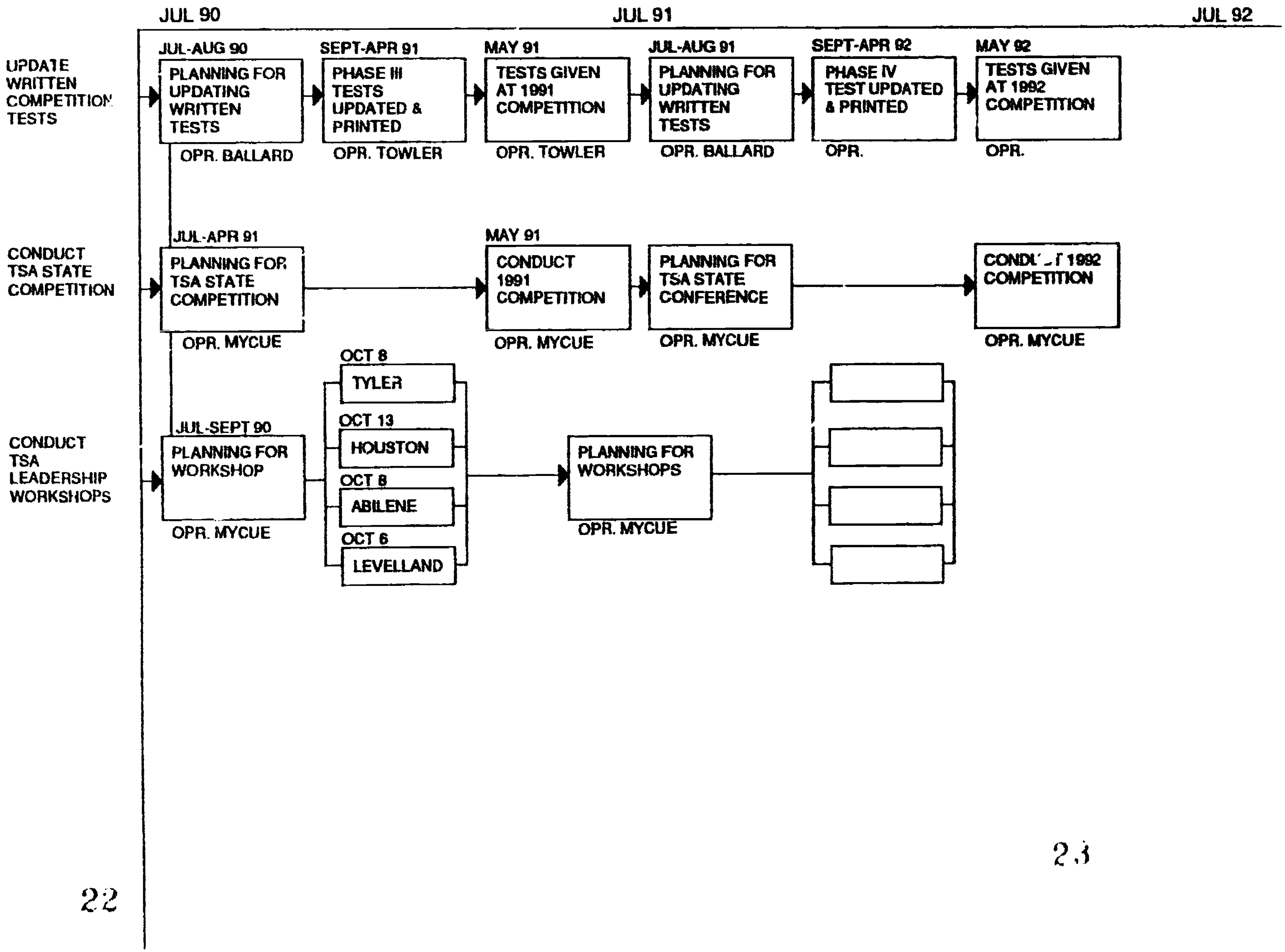
. A portion of the written tests for state competition are developed

. TEA publishes ITE Evaluation Guide

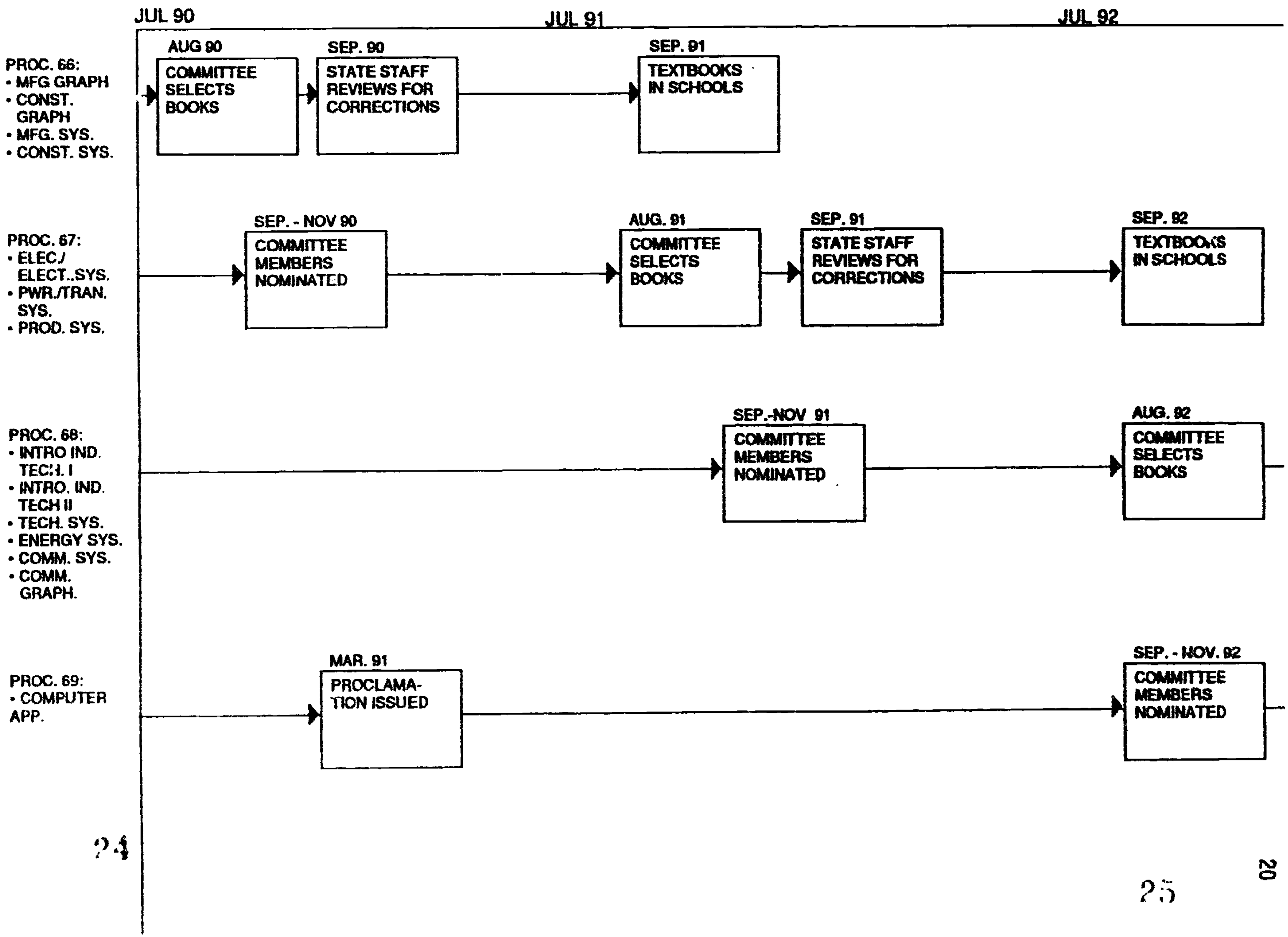
. TEA publishes ITE Facility Guide


JUL 90
JUL 91
JUL 92
TEA UPDATING OF CHAPTER 75
AUG-JAN 91
TEA MODIFIES CHAPTER 75
FEB-APR 91
CLUSTER GROUPS REVIEW CHAPTER 75
FEB-APR 92
CLUSTER GROUPS REVIEW CHAPTER 75
ATTE UPDATING OF CHAPTER 75
OCT 90
CURR. COMM. RECOMMENDS CHANGES IN CHAPTER 75
OPR. ALLEN
OCT 91
CURR. COMM. RECOMMENDS CHANGES IN CHAPTER 75
OPR. ALLEN
DEVELOPMENT OF FACILITY GUIDE
JAN-FEB 91
FACILITY GUIDE COMPLETED
OPR. WINDHAM
SEPT 91
FACILITY GUIDE PRINTED
OPR. BALLARD
OCT-NOV 91
FACILITY GUIDE DISSEMINATED
OPR. BALLARD
UPDATE ITE EVALUATION GUIDE
NOV 91
EVALUATION GUIDE EDITED
OPR. BALLARD
APR 92
EVALUATION GUIDE PRINTED
OPR. BALLARD
AUG 92
EVALUATION GUIDE DISSEMINATED
OPR. BALLARD
TSA COMPETITION RULE BOOK UPDATED
OCT 91 - JUL 92
1990 TSA COMPETITION RULE BOARD UPDATED
OPR. BALLARD
AUG 91
UPDATED TSA RULE BOOK DISSEMINATED
OPR. BALLARD

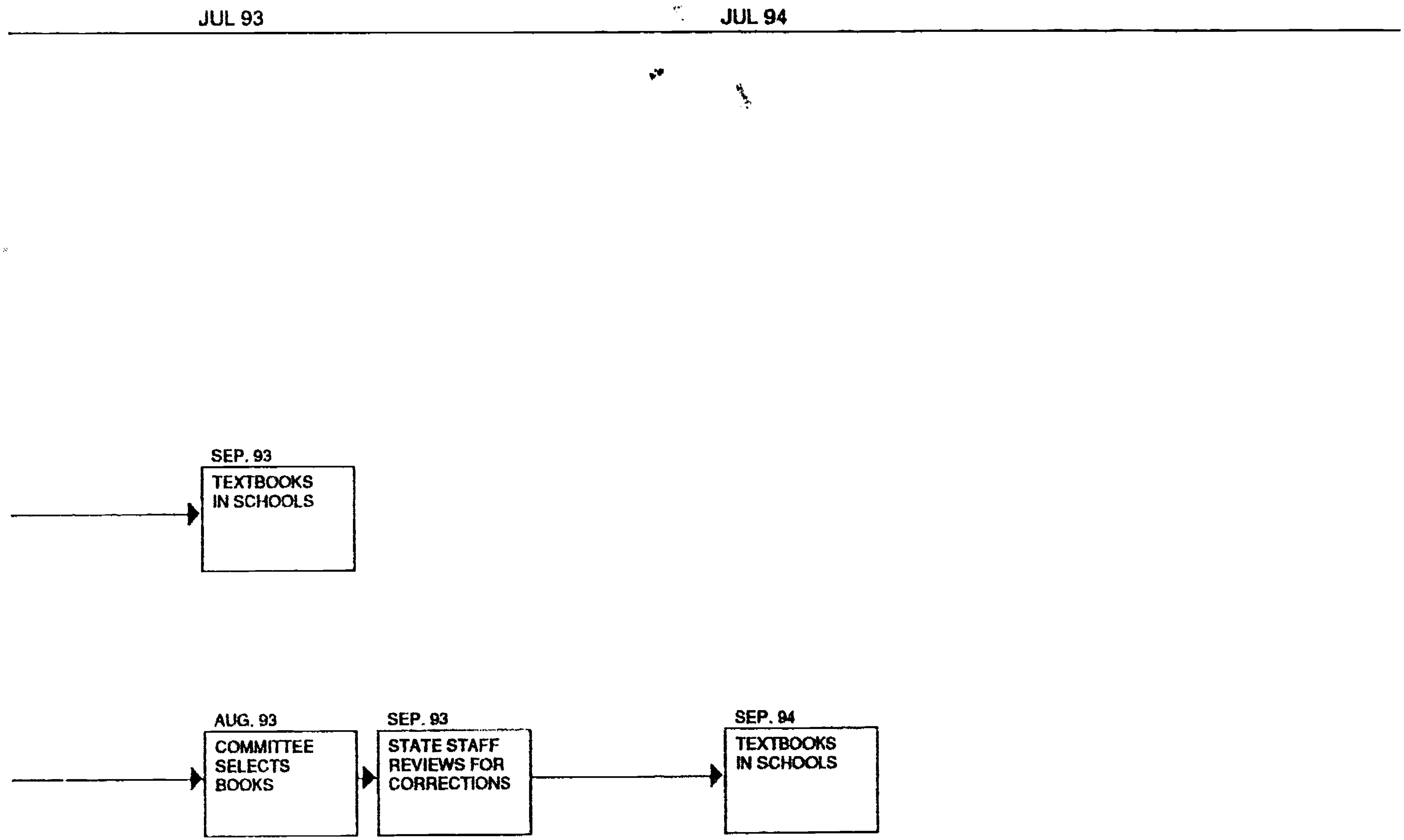
MULTI-YEA PLAN 1990-91 PLANNING AREA: C RICULUM # 2 PLANNING OBJECTIVE MULTIPLE



MULTI YEA⌐ ᴾLAN 1990-94 PLANNING AREA: CURRICULU⌐ ⁴3 PLANNING OBJECTIVE: TEXTBOOK ADOP⁻ᴵONS



CURRICULUM CONTINUED

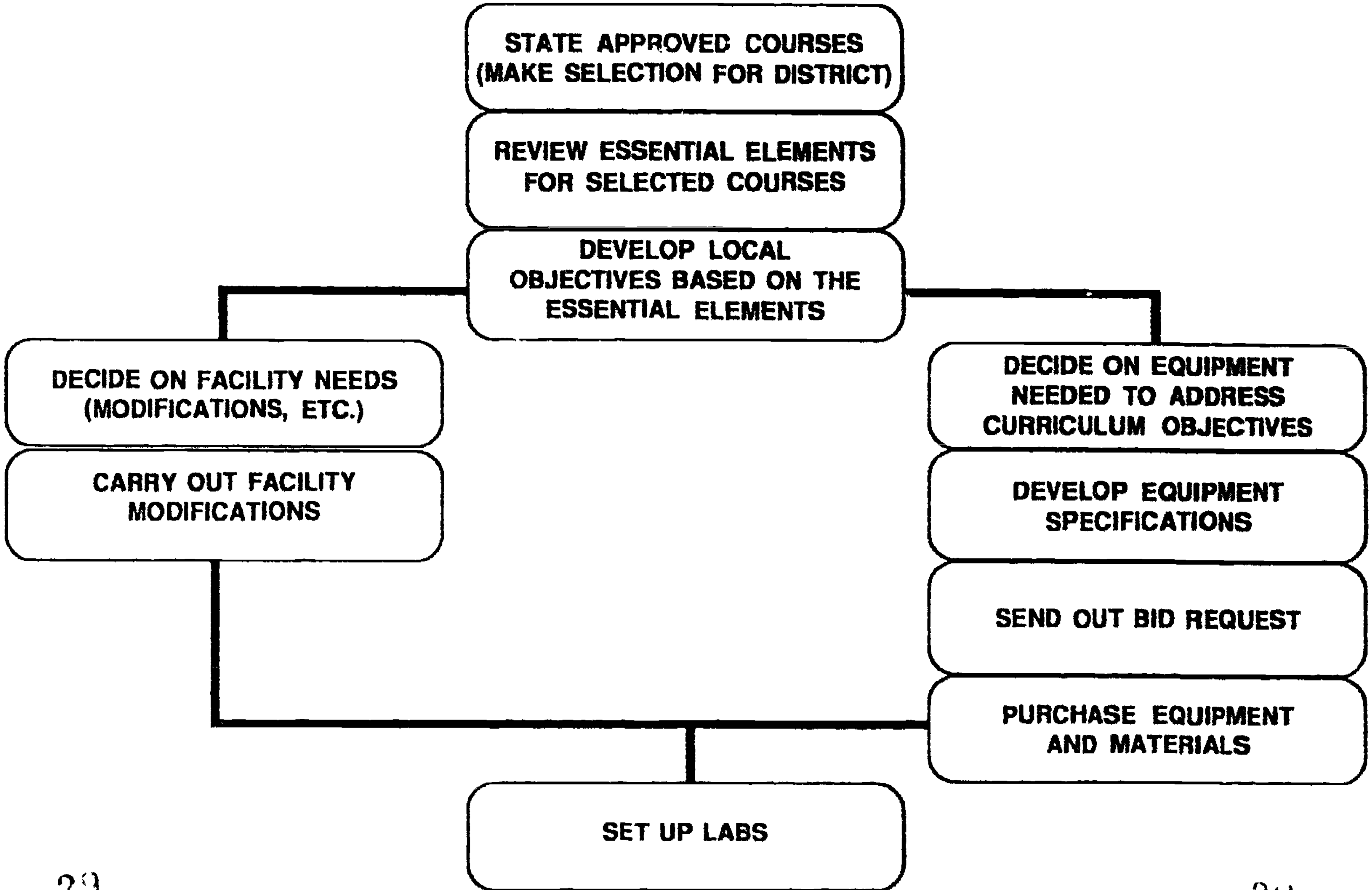


DISCRETIONARY FEDERAL VOCATIONAL FUNDS USED FOR STATE LEVEL ACTIVITY IN INDUSTRIAL TECHNOLOGY

	90-91	89-90	88-89	87-88	86-87	85-86
Curriculum Materials Development (ELMC)	$176,000	$176,000	$176,000	$168,828	$55,000	$125,000
Inservice Conference (TEA)	$25,000	$22,000	$20,000	$10,000	$6,875	
Workshops	$47,000	$38,000	$30,000		$6,800	$50,000
Other Projects	$50,000					$65,000
Totals	$298,000	$236,000	$226,000	$178,828	$68,675	$240,000

Appendix D

IMPLEMENTATION PROCESS



Appendix E

(75.217) (g) Industrial technology education. The full scope of the high school industrial technology education program, grades nine-12, shall include the comprehensive course and / or at least one course from each of the following areas: communication, energy, and production technology.

Examples of Campus Offerings Satisfying the Above Requirement

Appendix F

	COMMUNICATION TECHNOLOGY	ENERGY TECHNOLOGY	PRODUCTION TECHNOLOGY	COURSES COVERING ALL THREE TECHNOLOGIES
EXAMPLE #1				Technology Systems (Comprehensive Course)
EXAMPLE #2	Manufacturing Graphics Construction Graphics			Technology Systems
EXAMPLE #3	ManufacturingGraphics	Power/ Trans. Systems	Manufacturing Systems	
EXAMPLE #4	Communication Systems	Energy Systems	Production Systems	